User Manual

Revision 1.003
English

Modbus Master / SNMP - Converter

(Order Code: HD67164-232-A1, HD67164-485-A1, HD67164-422-A1, HD67164-232-485-A1, HD67164-232-422-A1, HD67164-232-B2, HD67164-485-B2, HD67164-232-485-B2)

for Website information:
www.adfweb.com?Product=HD67164

for Price information:
www.adfweb.com?Price=HD67164-232-A1
www.adfweb.com?Price=HD67164-485-A1
www.adfweb.com?Price=HD67164-422-A1
www.adfweb.com?Price=HD67164-232-485-A1
www.adfweb.com?Price=HD67164-232-422-A1
www.adfweb.com?Price=HD67164-232-B2
www.adfweb.com?Price=HD67164-485-B2
www.adfweb.com?Price=HD67164-232-485-B2

Benefits and Main Features:

- Very easy to configure
- Electrical isolation
- Temperature range: -40°C/85°C (-40°F/185°F)

For others SNMP products, see also the following links:

Converter SNMP to

www.adfweb.com?Product=HD67040	**(DMX)**
www.adfweb.com?Product=HD67155	**(CAN)**
www.adfweb.com?Product=HD67156	**(CANopen)**
www.adfweb.com?Product=HD67159	**(EtherNet/IP)**
www.adfweb.com?Product=HD67160	**(DeviceNet Master)**
www.adfweb.com?Product=HD67161	**(DeviceNet Slave)**
www.adfweb.com?Product=HD67162	**(J1939)**
www.adfweb.com?Product=HD67163	**(M-Bus Master)**
www.adfweb.com?Product=HD67165	**(Modbus Slave)**
www.adfweb.com?Product=HD67166	**(Modbus TCP Master)**
www.adfweb.com?Product=HD67167	**(Modbus TCP Slave)**
www.adfweb.com?Product=HD67168	**(PROFIBUS Master)**
www.adfweb.com?Product=HD67169	**(PROFIBUS Slave)**
www.adfweb.com?Product=HD67613	**(PROFINET)**
www.adfweb.com?Product=HD67693	**(BACnet Slave)**
www.adfweb.com?Product=HD67726	**(BACnet Master)**
www.adfweb.com?Product=HD67820	**(KNX)**

Do you have an your customer protocol?
www.adfweb.com?Product=HD67003

Do you need to choose a device? do you want help?
www.adfweb.com?Cmd=helpme

User Manual

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UPDATED DOCUMENTATION:

Dear customer, we thank you for your attention and we remind you that you need to check that the following document is:

- Updated
- Related to the product you own

To obtain the most recently updated document, note the "document code" that appears at the top right-hand corner of each page of this document.

With this "Document Code" go to web page www.adfweb.com/download/ and search for the corresponding code on the page. Click on the proper "Document Code" and download the updates.

REVISION LIST:

Revision	Date	Author	Chapter	Description
1.000	05/01/2015	Ff	All	First Release
1.001	05/10/2015	Ff	All	Added new feature
1.002	11/01/2016	Nt	All	Revision
1.003	25/01/2016	Ff	All	New functioning of LEDs

WARNING:

ADFweb.com reserves the right to change information in this manual about our product without warning.
ADFweb.com is not responsible for any error this manual may contain.

TRADEMARKS:

All trademarks mentioned in this document belong to their respective owners.

SECURITY ALERT:

GENERAL INFORMATION

To ensure safe operation, the device must be operated according to the instructions in the manual. When using the device, legal and safety regulation are required for each individual application. The same applies also when using accessories.

INTENDED USE

Machines and systems must be designed so the faulty conditions do not lead to a dangerous situation for the operator (i.e. independent limit switches, mechanical interlocks, etc.).

QUALIFIED PERSONNEL

The device can be used only by qualified personnel, strictly in accordance with the specifications.
Qualified personnel are persons who are familiar with the installation, assembly, commissioning and operation of this equipment and who have appropriate qualifications for their job.

RESIDUAL RISKS

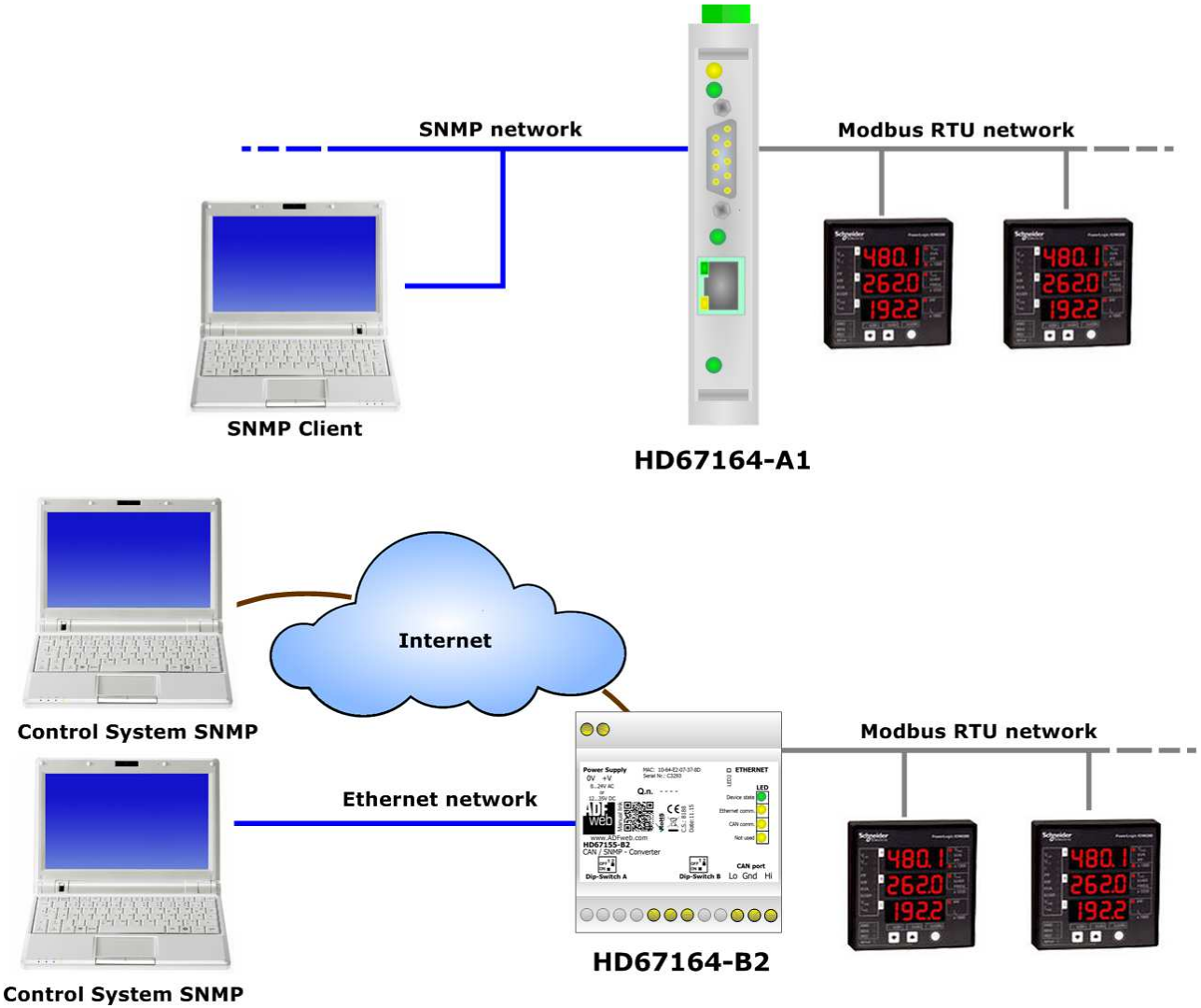
The device is state-of-the-art and is safe. The instruments can represent a potential hazard if they are inappropriately installed and operated by untrained personnel. These instructions refer to residual risks with the following symbol:

This symbol indicates that non-observance of the safety instructions is a danger for people that could lead to serious injury or death and / or the possibility of damage.

CE CONFORMITY

The declaration is made by our company. You can send an email to support@adfweb.com or give us a call if you need it.

EXAMPLE OF CONNECTION:



CONNECTION SCHEME:

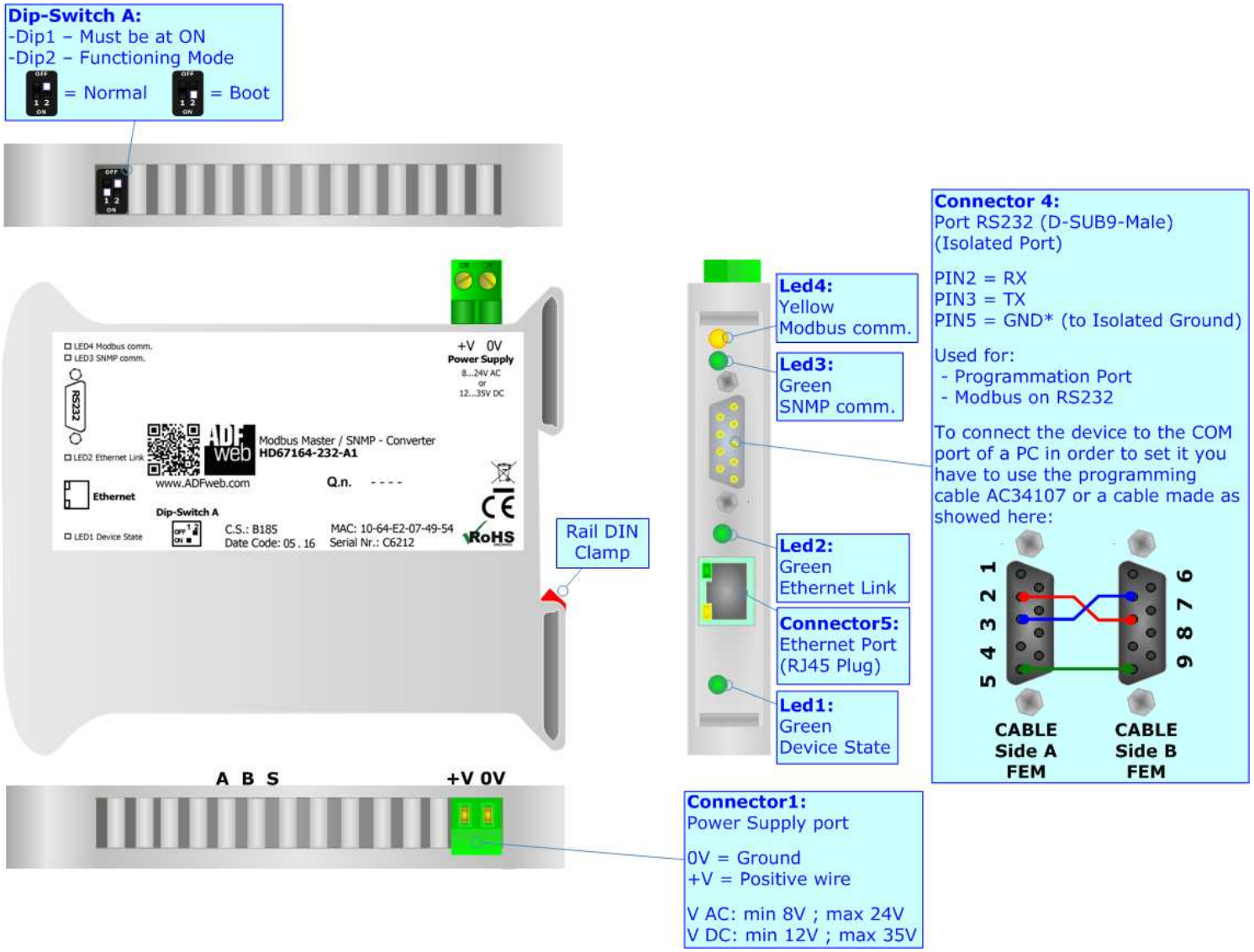


Figure 1a: Connection scheme for HD67164-232-A1

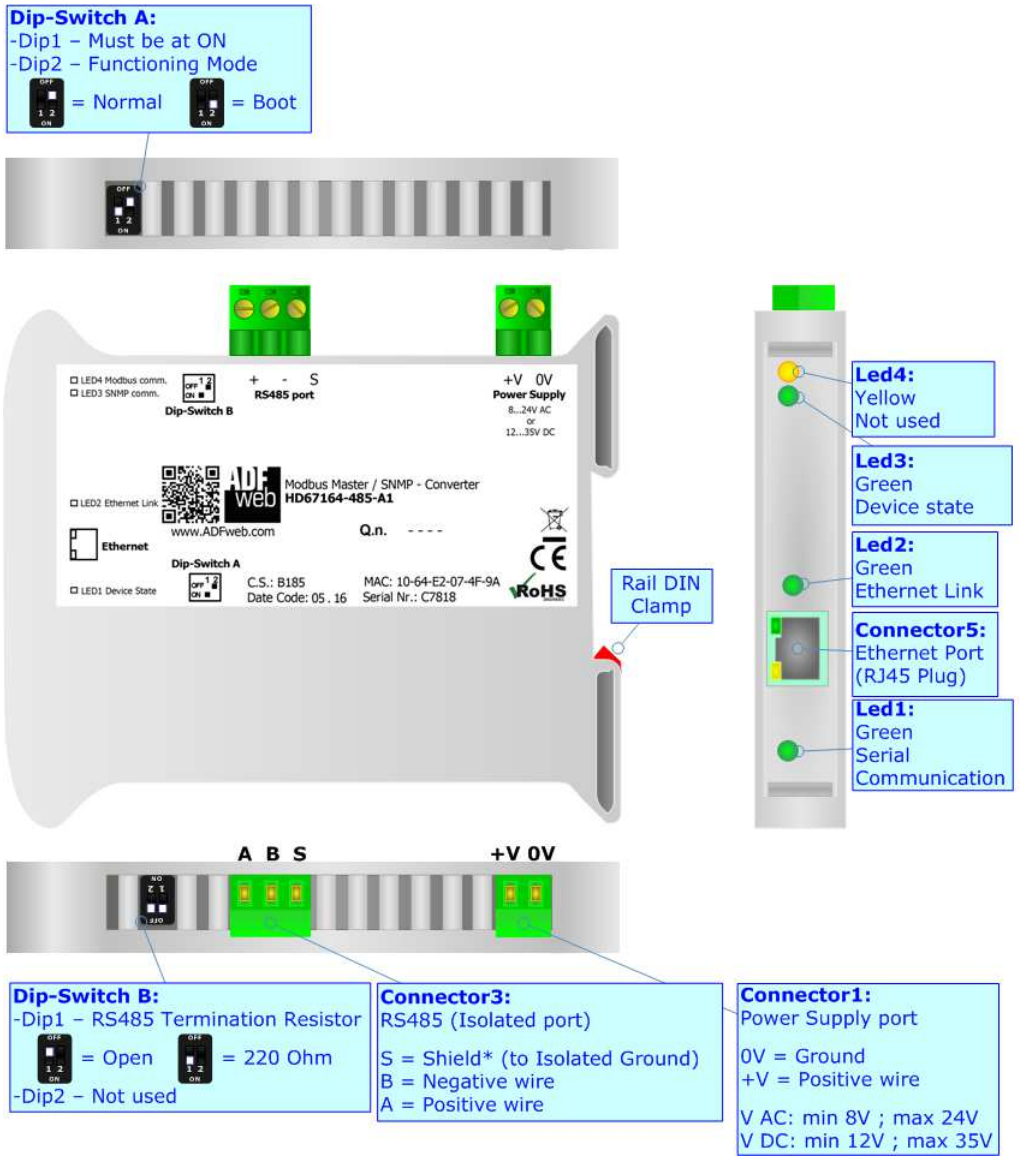


Figure 1b: Connection scheme for HD67164-485-A1

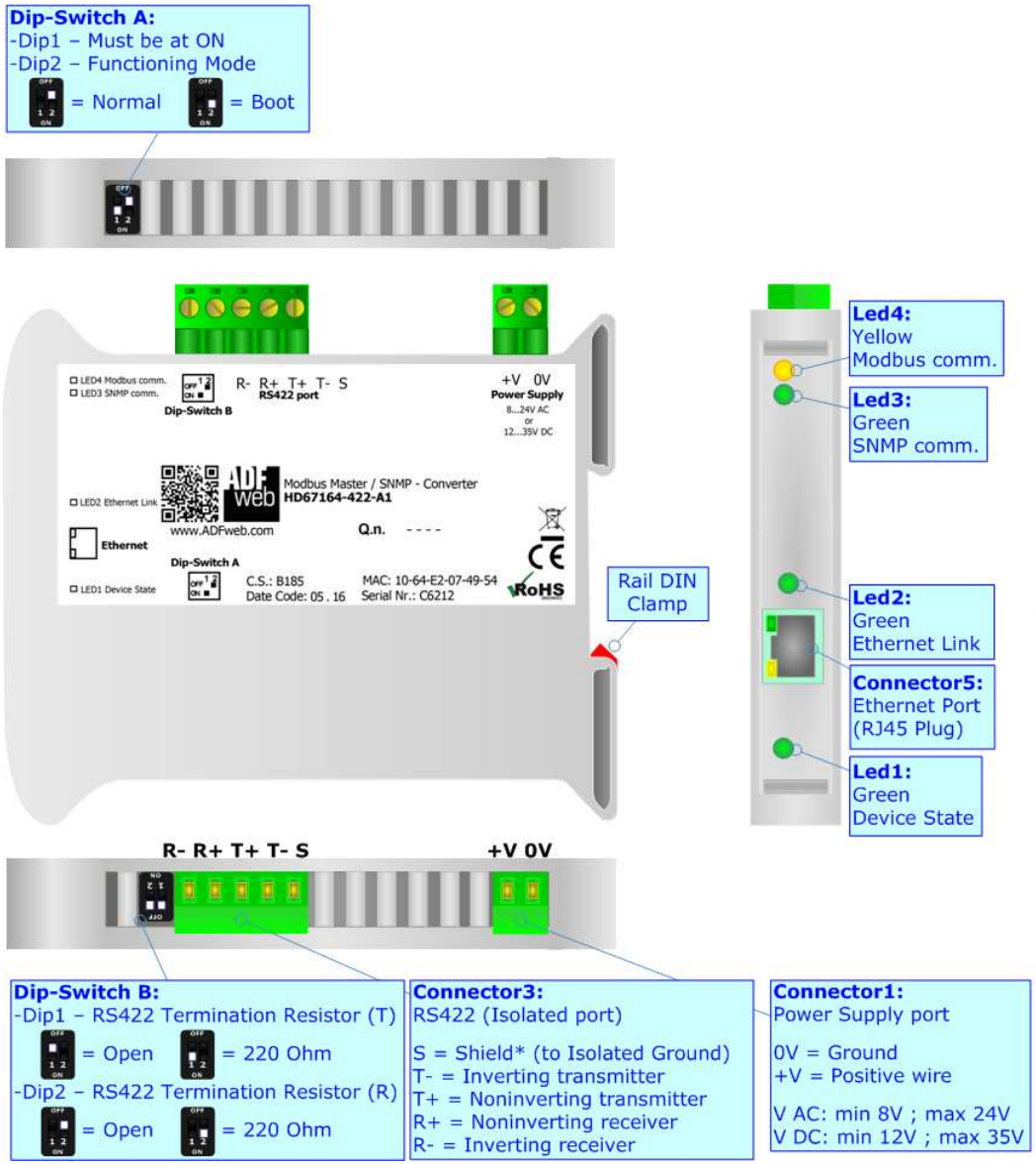


Figure 1c: Connection scheme for HD67164-422-A1

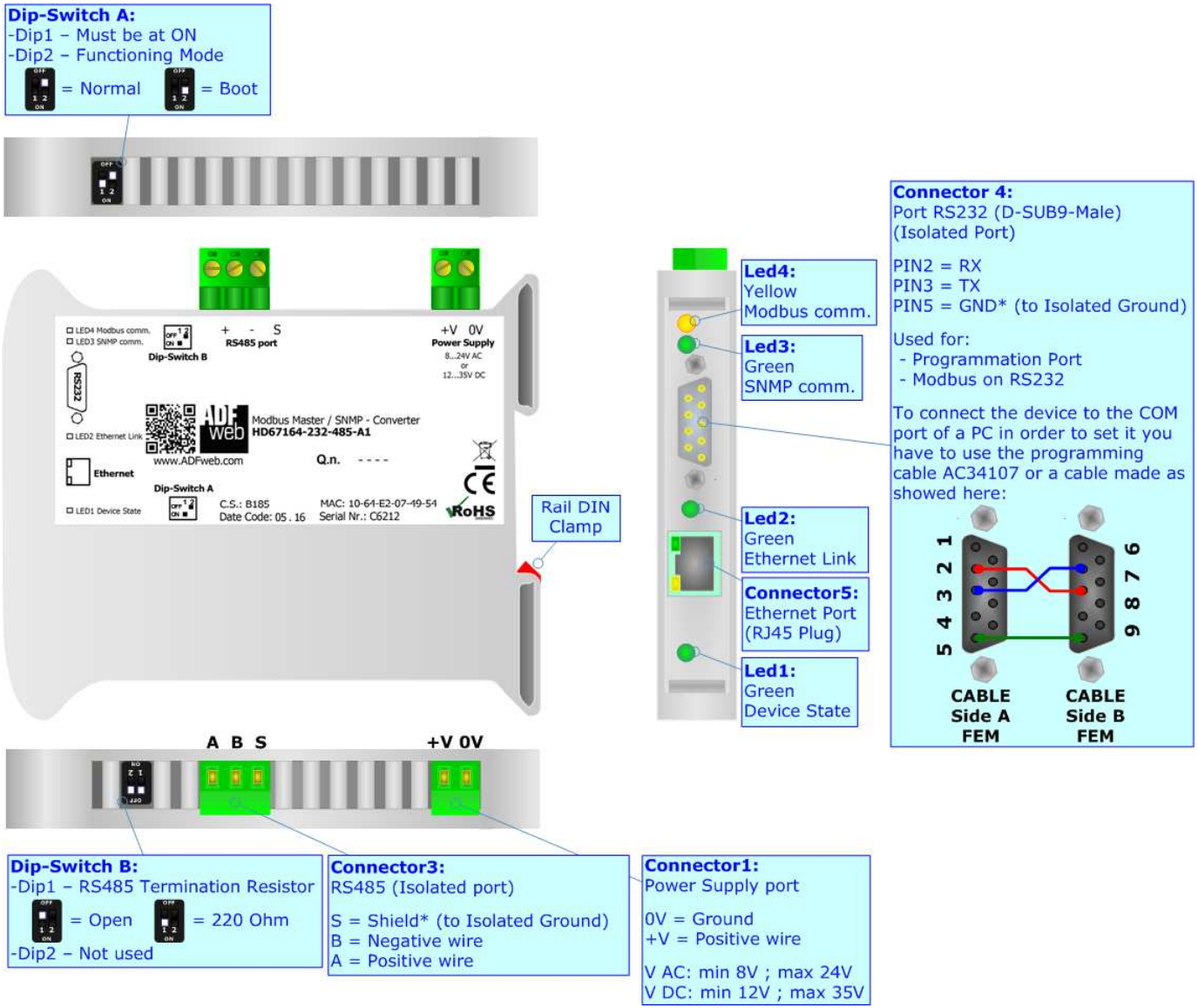


Figure 1d: Connection scheme for HD67164-232-485-A1

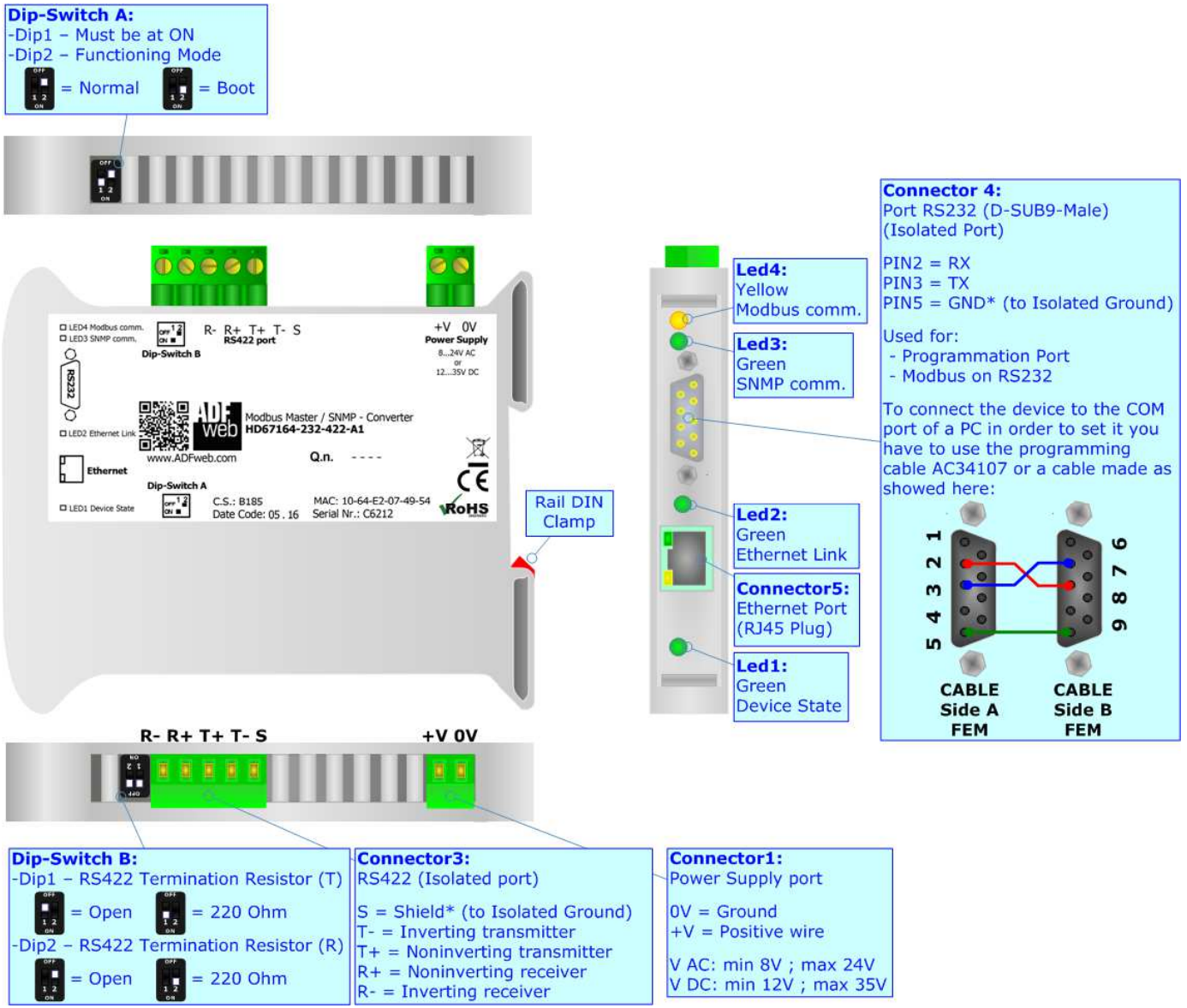


Figure 1e: Connection scheme for HD67164-232-422-A1

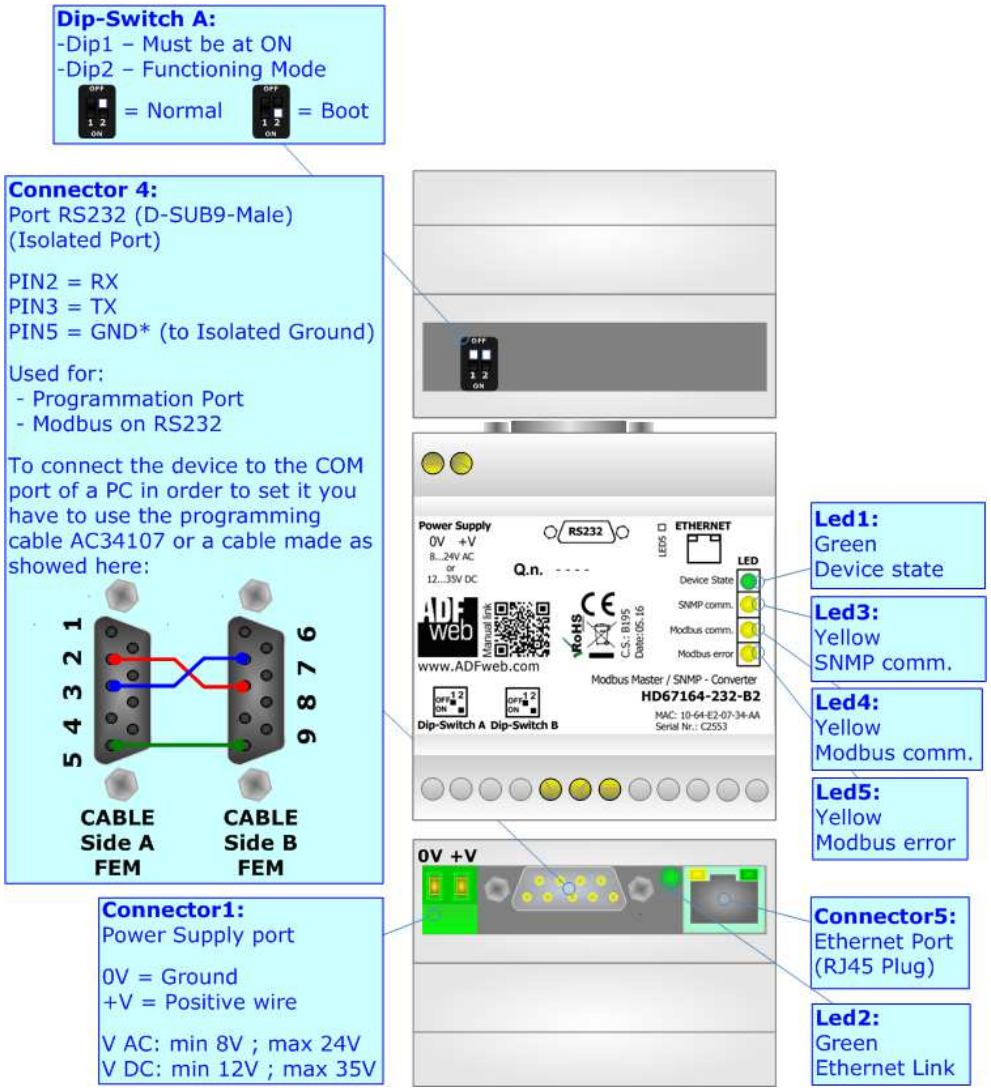


Figure 1f: Connection scheme for HD67164-232-B2

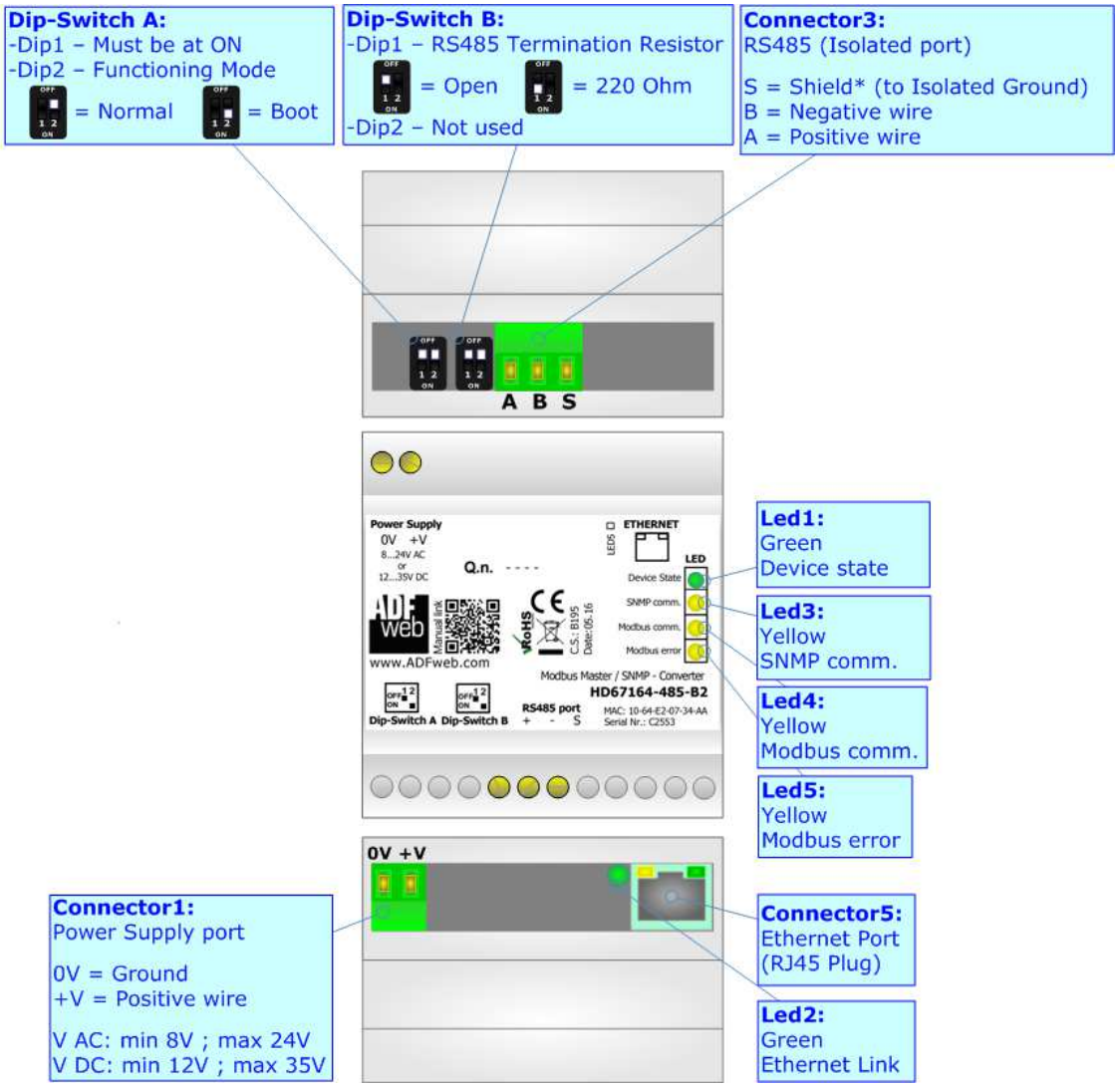


Figure 1g: Connection scheme for HD67164-485-B2

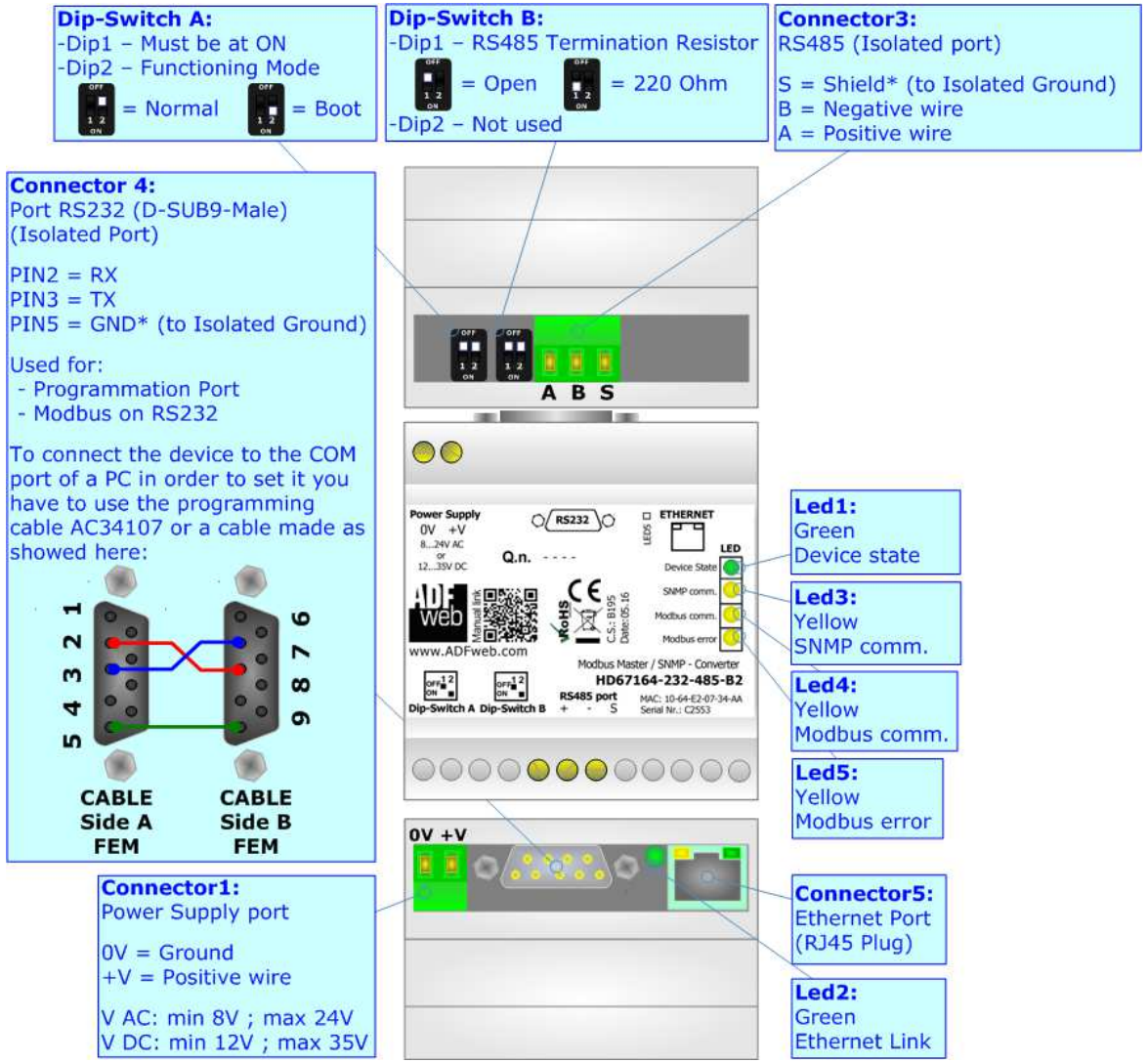


Figure 1g: Connection scheme for HD67164-232-485-B2

CHARACTERISTICS:

The HD67164-A1 and HD67164-B2 is a Modbus Master / SNMP - Converter.

It has the following characteristics:

- Up to 1024 bytes in reading and 1024 bytes in writing;
- Triple isolation between Serial - Power Supply, Serial - Ethernet, Power Supply - Ethernet.
- Two-directional information between Modbus bus and SNMP bus;
- Mountable on 35mm Rail DIN;
- Wide power supply input range: 8…24V AC or 12…35V DC;
- Wide temperature range: -40°C / 85°C [-40°F / +185°F].

CONFIGURATION:

You need Compositor SW67164 software on your PC in order to perform the following:

- Define the parameters of SNMP line;
- Define the parameters of Modbus line;
- Update the device.

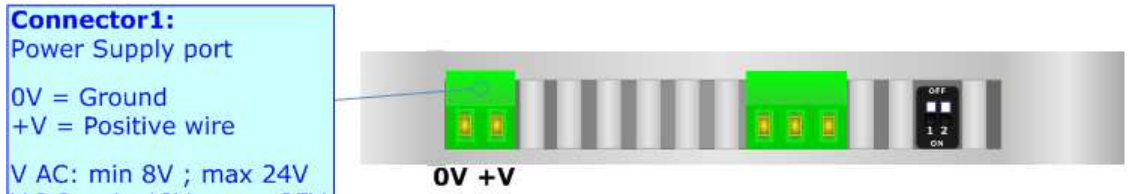
POWER SUPPLY:

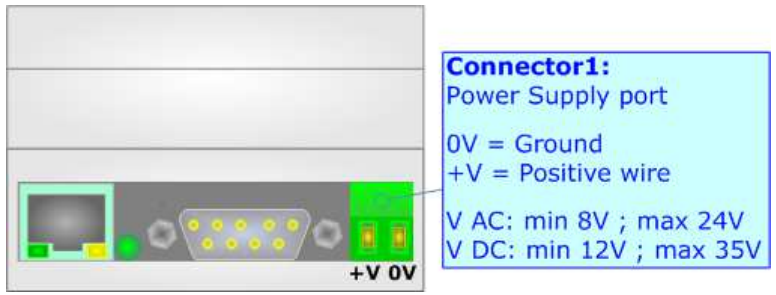
The devices can be powered at 8…24V AC and 12…35V DC. For more details see the two tables below.

VAC ~		VDC ⎓	
Vmin	**Vmax**	**Vmin**	**Vmax**
8V	**24V**	**12V**	**35V**

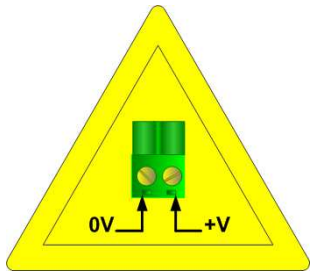
Consumption at 24V DC:

Device	Consumption [W/VA]
HD67164-xxx-A1	3.5
HD67164-xxx-B2	3.5

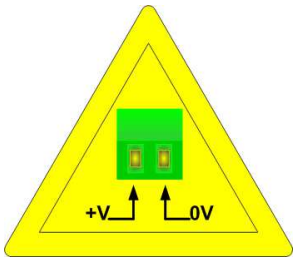




Caution: Not reverse the polarity power



HD67164-xxx-A1



HD67164-xxx-B2

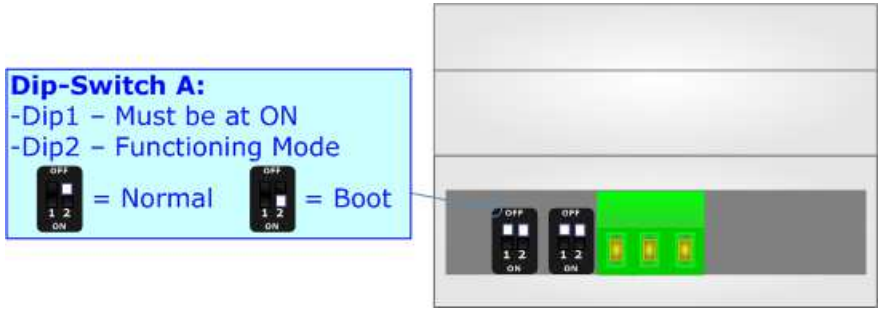
FUNCTION MODES:

The device has got two functions mode depending of the position of the 'Dip2 of Dip-Switch A':

- The first, with 'Dip2 of Dip-Switch A' at "OFF" position, is used for the normal working of the device.
- The second, with 'Dip2 of Dip-Switch A' at "ON" position, is used for upload the Project and/or Firmware.

For the operations to follow for the updating, see 'UPDATE DEVICE' section.

According to the functioning mode, the LEDs will have specifics functions, see 'LEDS' section.

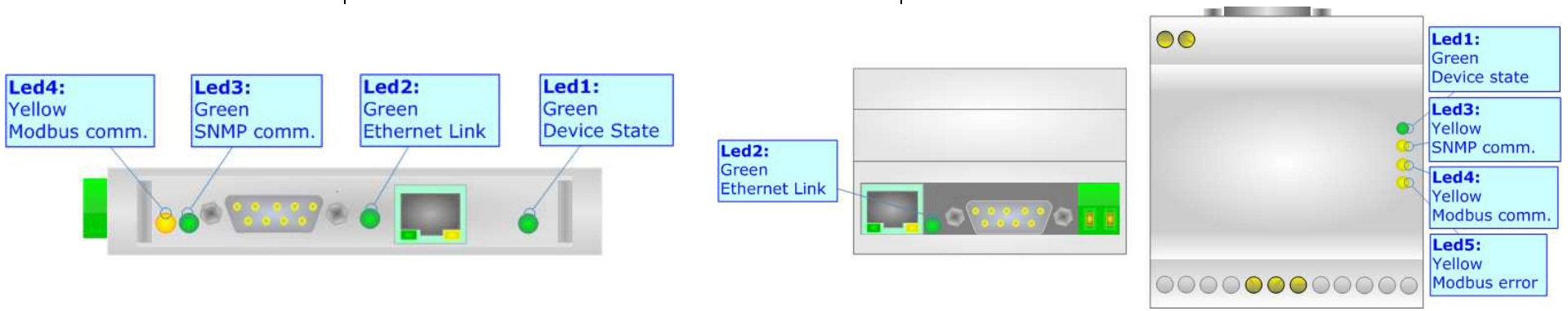


Warning:
Dip1 of 'Dip-Switch A' must be at ON position for working even if the Ethernet cable isn't inserted.

LEDS:

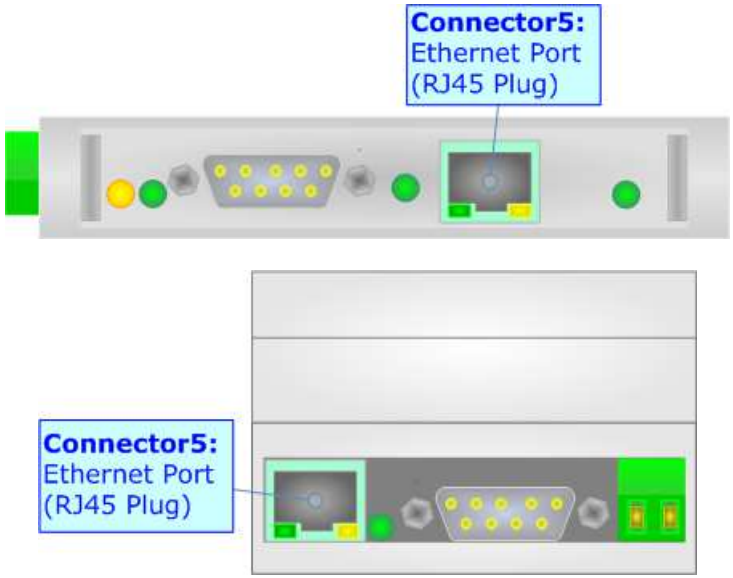
The devices have got four (five for HD67164-B2) LEDs that are used to give information of the functioning status.
The various meanings of the LEDs are described in the table below.

LED	Normal Mode	Boot Mode
1: Device state (green)	Blinks slowly (~1Hz)	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
2: Ethernet Link (green)	**ON**: Ethernet cable connected **OFF**: Ethernet cable disconnected	**ON: Ethernet cable connected** **OFF: Ethernet cable disconnected**
3: SNMP communication (green)	Blinks when a SNMP request is received	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
4: Modbus communication (green)	Blinks when Modbus frames (RS232/RS485/RS422) are received	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
5: Modbus error (yellow) (Present only on HD67164-B2)	**ON**: at least one configured Modbus request hasn't correct reply **OFF**: communication is working	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress



SNMP:

The SNMP connection must be made using Connector5 of HD67164-A1/B2 with at least a Category 5E cable. The maximum length of the cable should not exceed 100m. The cable has to conform to the T568 norms relative to connections in cat.5 up to 100 Mbps. To connect the device to an Hub/Switch is recommended the use of a straight cable, to connect the device to a PC/other is recommended the use of a cross cable.

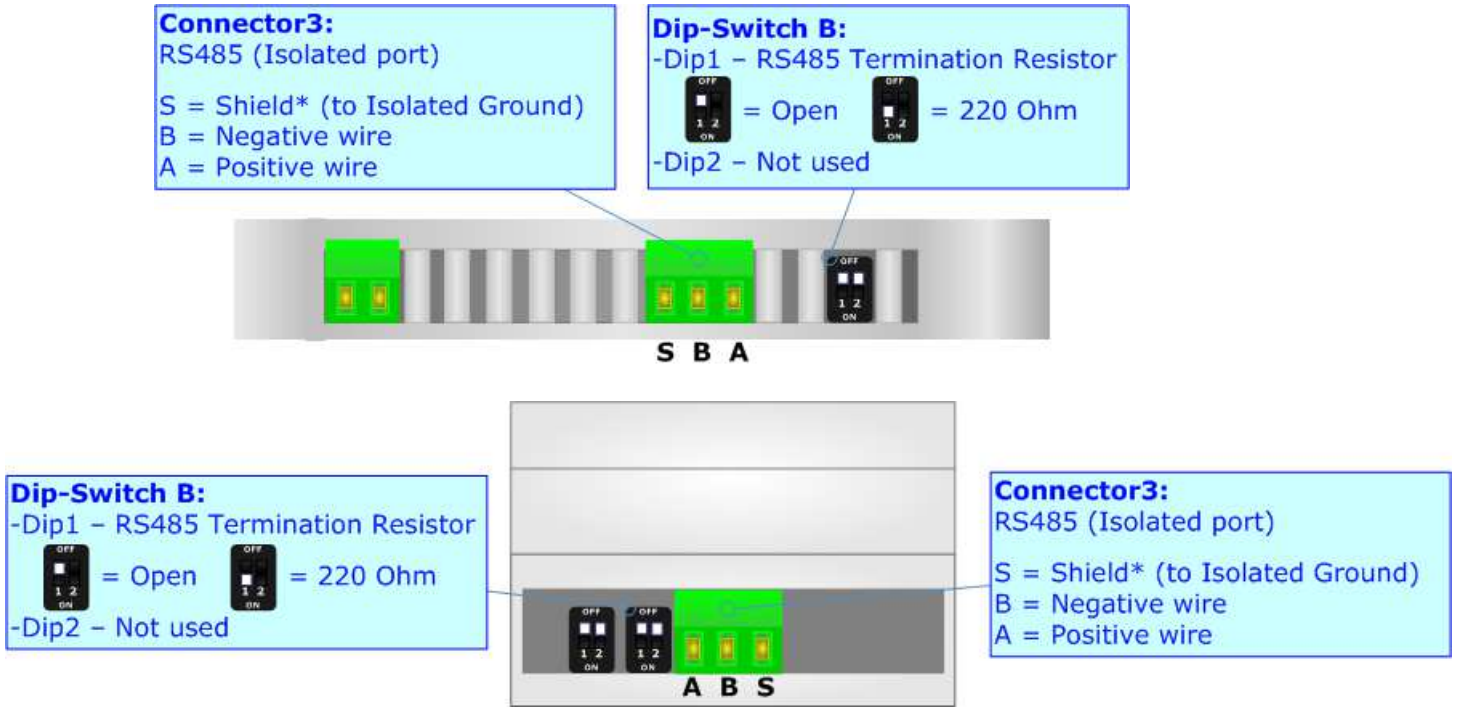


RS232:

The connection from RS232 socket to a serial port (example one from a personal computer) must be made with a NULL MODEM cable (a serial cable where the pins 2 and 3 are crossed).
It is recommended that the RS232 cable not exceed 15 meters.

RS485:

For terminate the RS485 line with a 220Ω resistor it is necessary to put ON dip 1, like in figure.



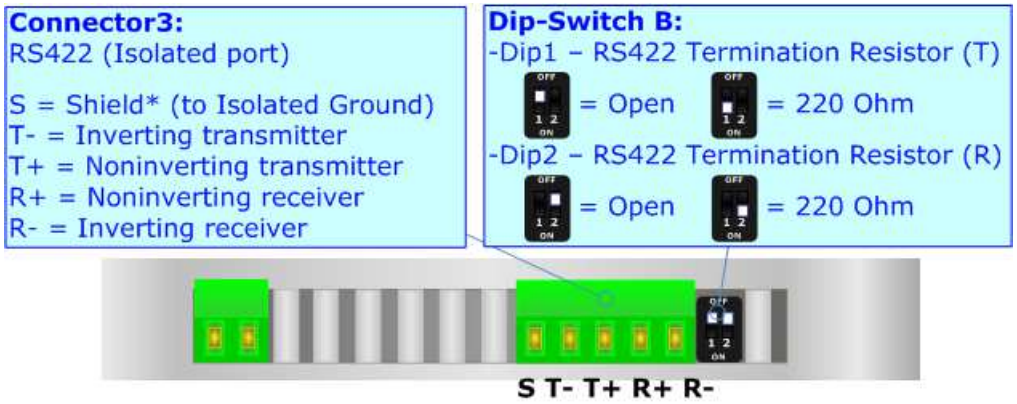
The maximum length of the cable should be 1200m (4000 feet).

Here some codes of cables:

- Belden: p/n 8132 - 2x 28AWG stranded twisted pairs conductor + foil shield + braid shield;
- Belden p/n 82842 - 2x 24AWG stranded twisted pairs conductor + foil shield + braid shield;
- Tasker: p/n C521 - 1x 24AWG twisted pair conductor + foil shield + braid shield;
- Tasker: p/n C522 - 2x 24AWG twisted pairs conductor + foil shield + braid shield.

RS422:

For terminate the RS485 line with a 220Ω resistor it is necessary to put ON dip 1 for T line and/or put ON dip 2 for R line, like in figure.



The maximum length of the cable should be 1200m (4000 feet).

USE OF COMPOSITOR SW67164:

To configure the Converter, use the available software that runs with Windows called SW67164. It is downloadable on the site www.adfweb.com and its operation is described in this document. *(This manual is referenced to the last version of the software present on our web site)*. The software works with MSWindows (XP, Vista, Seven, 8, 10; 32/64bit).

When launching the SW67164, the window below appears (Fig. 2).

Note:
It is necessary to have installed .Net Framework 4.

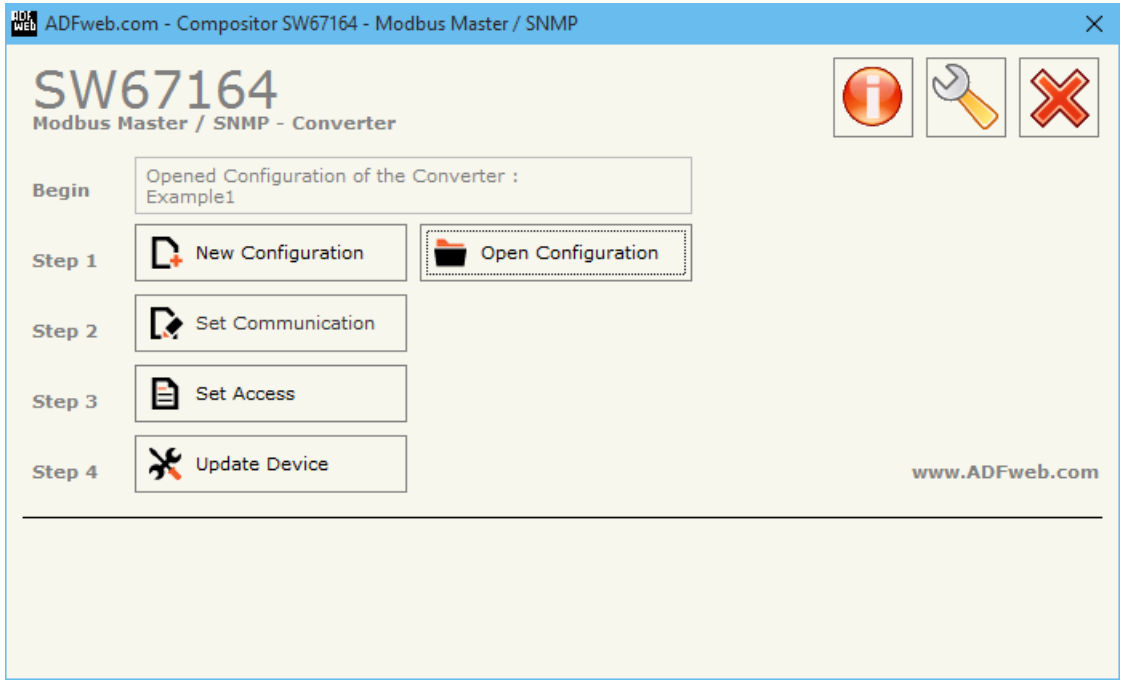
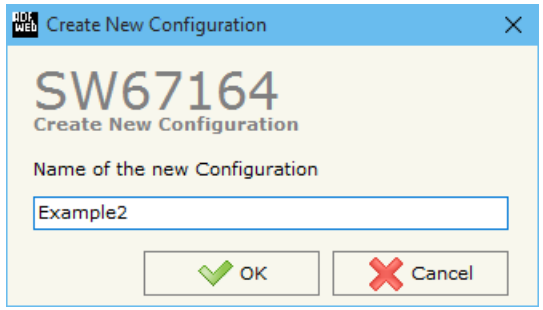


Figure 2: Main window for SW67164

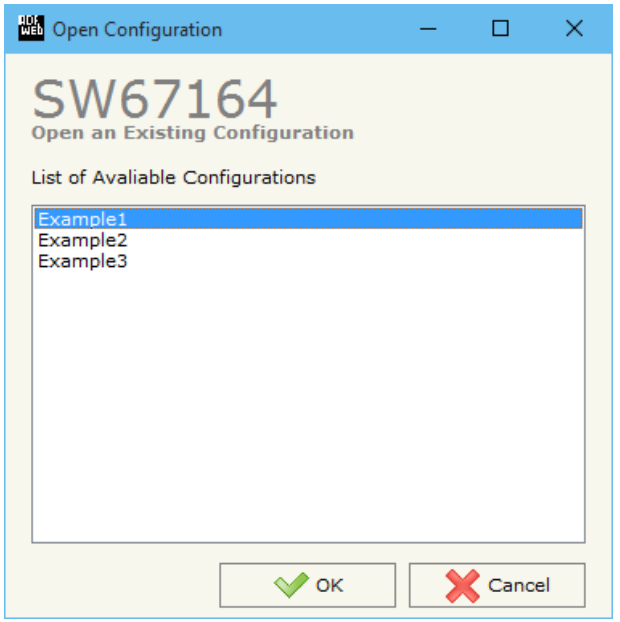
NEW CONFIGURATION / OPEN CONFIGURATION:

The "**New Configuration**" button creates the folder which contains the entire device's configuration.



A device's configuration can also be imported or exported:

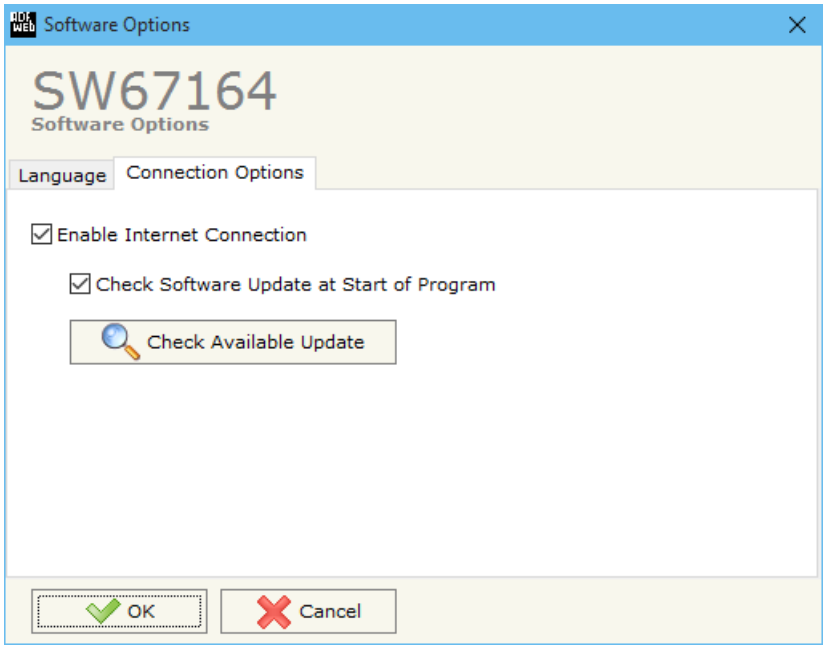
- To clone the configurations of a Programmable "Modbus Master / SNMP - Converter" in order to configure another device in the same manner, it is necessary to maintain the folder and all its contents;
- To clone a project in order to obtain a different version of the project, it is sufficient to duplicate the project folder with another name and open the new folder with the button "**Open Configuration**".



SOFTWARE OPTIONS:

By pressing the "**Settings**" ( ) button there is the possibility to change the language of the software and check the updatings for the compositor.

In the section "Language" it is possible to change the language of the software.



In the section "Connection Options", it is possible to check if there are some updatings of the software compositor in ADFweb.com website.
Checking the option "**Check Software Update at Start of Program**", the SW67164 check automatically if there are updatings when it is launched.

SET COMMUNICATION:

This section define the fundamental communication parameters of two buses, SNMP and Modbus.

By Pressing the "**Set Communication**" button from the main window for SW67164 (Fig. 2) the window "Set Communication" appears (Fig. 3).
The window is divided in two sections, one for the SNMP and the other for the Modbus Master.

The means of the fields for "SNMP" are:

- In the field "**IP ADDRESS**" insert the IP address that you want to give to the Converter;
- In the field "**SUBNET Mask**" insert the SubNet Mask;
- In the field "**GATEWAY**" insert the default gateway that you want to use. This feature can be enabled or disabled pressing the Check Box field. This feature is used for going out of the net;
- In the field "**SNMP Name of Station**" is possible to assign a name to the SNMP node.

The means of the fields for the "Modbus Master" section are:

- In the field "**Serial**" the serial to use is defined (RS232, RS485 or RS422);
- In the field "**Baudrate**" the baudrate for the serial line is defined;
- In the field "**Parity**" the parity of the serial line is defined;
- In the "**TimeOut (ms)**" define the maximum time that the device attends for the answer from the slave interrogated;
- In the field "**Communication Idle Time (ms)**" the minimum delay between two requests is defined.

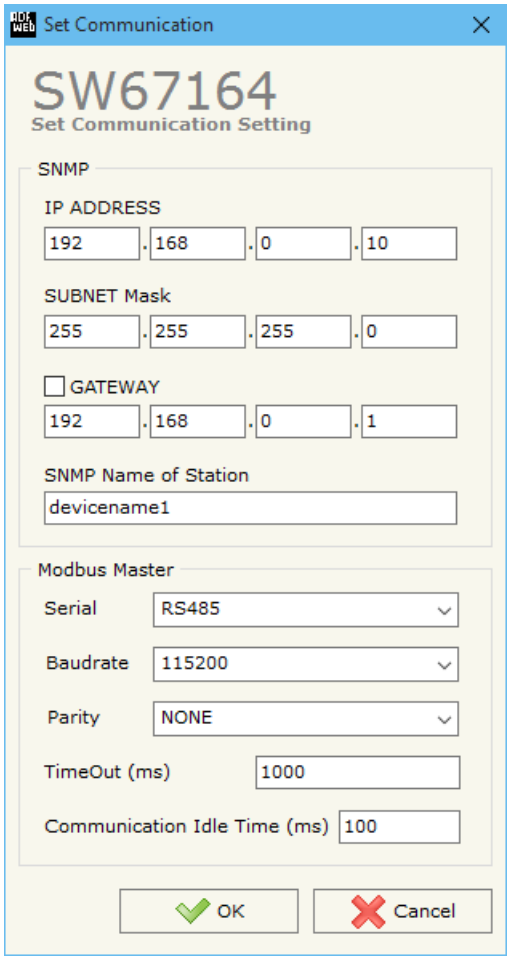


Figure 3: "Set Communication" window

SET ACCESS:

By pressing the "**Set Access**" button from the main window for SW67164 (Fig. 2) the window "Set Access" appears.

This window is divided in two parts, the "Modbus Read" (Fig. 4) and the "Modbus Write " (Fig. 5).
The first part "Modbus Read" is used to read the data from the Modbus slaves, and make them available to read from the Master PROFINET.
The second part "Modbus Write " is used to write the data that arrives from the Master PROFINET into the slaves Modbus.

MODBUS READ

The means of the fields are:

- In the field "**Slave ID**" the address of the Modbus device you have to read is defined;
- In the field "**Type**" insert the data type of the register you would like to read. You can choose between the following:
  - Coil Status;
  - Input Status
  - Holding Register;
  - Input Register.

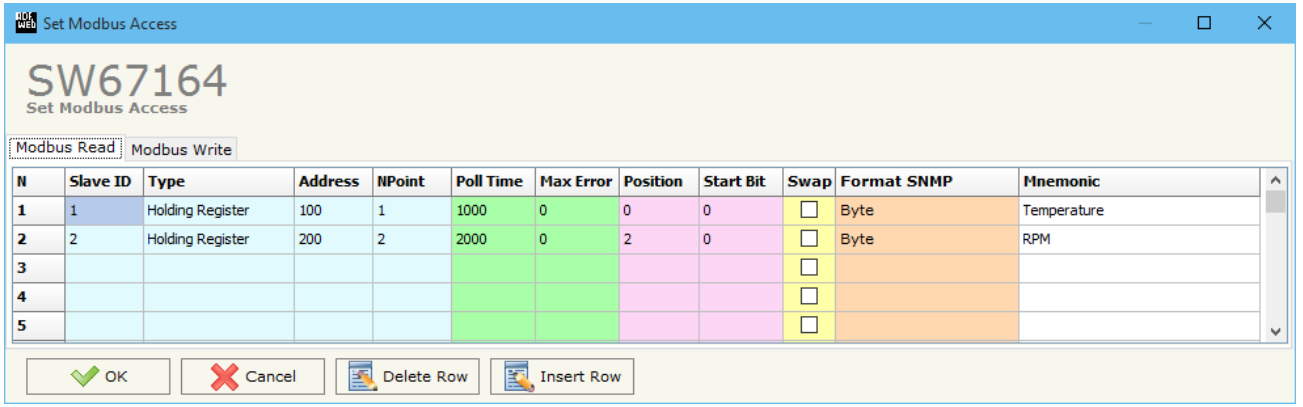


Figure 4: "Set Access→Modbus Read"

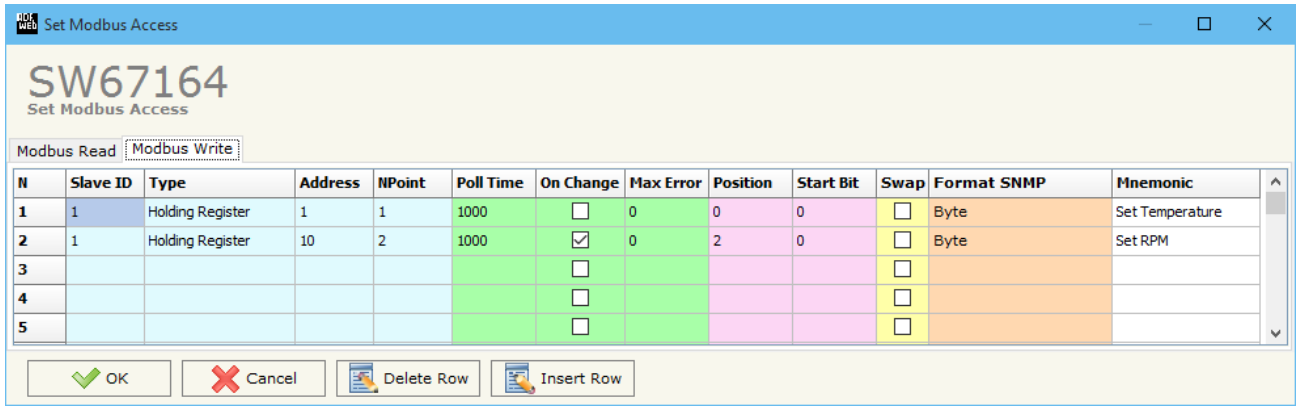
- In the field "**Address**" the start address of the register to be read is defined;
- In the field "**NPoint**" insert the number of consecutive registers to be read;
- In the field "**Poll Time**" insert the time to make this request;
- In the field "**Max Error**" is the number of errors continues that the gateway waits before suspending the poll until the next reboot. If is set to zero this function is disabled;
- In the field "**Position**" insert the address of the SNMP array where place the information;
- In the field "**Start Bit**" insert the start bit of the first byte of the field "Position" where start to insert the data read. Valid only for the "Coil Status" and "Input Status";
- If the field "**SWAP**" is checked, the data from the Modbus registers are swapped;

- In the field "**Format SNMP**", the format of the SNMP value is defined. In order to read each raw of the table as a defined OID with the defined format, see page 31 of the manual;
- In the field "**Mnemonic**" the description for the request is defined.

MODBUS WRITE

The means of the fields are:

- In the field "**Slave ID**" the address of the Modbus device that you have to write is defined;
- In the field "**Type**" insert the data type of the register you would like to read. You can choose between the following:
  - Coil Status;
  - Holding Register.
- In the field "**Address**" the start address of the register to be written is defined;



N	Slave ID	Type	Address	NPoint	Poll Time	On Change	Max Error	Position	Start Bit	Swap	Format SNMP	Mnemonic
1	1	Holding Register	1	1	1000	☐	0	0	0	☐	Byte	Set Temperature
2	1	Holding Register	10	2	1000	☑	0	2	0	☐	Byte	Set RPM
3						☐				☐		
4						☐				☐		
5						☐				☐		

Figure 5: "Set Access→Modbus Write" window

- In the field "**NPoint**" insert the number of consecutive registers to be written;
- In the field "**Poll Time**" insert the time to make this request;
- If the field "**On Change**" is checked, the gateway send the Write request in Modbus when the data change the value.
- In the field "**Max Error**" is the number of errors continues that the gateway waits before suspending the poll until the next reboot. If is set to zero this function is disabled;
- In the field "**Position**" insert the address of the SNMP array where read the information;
- In the field "**Start Bit**" insert the start bit of the first byte of the field "Position" where start to read the data to write. Valid only for the "Coil Status";
- If the field "**SWAP**" is checked, the data of the Modbus registers are swapped;
- In the field "**Format SNMP**", the format of the SNMP value is defined. In order to write each raw of the table as a defined OID with the defined format, see page 31 of the manual;
- In the field "**Mnemonic**" the description for the request is defined.

Note:
If you want that the converter sends the data only "On change" the "Poll Time" must be at 0.

Note:
If the field "On change" is checked and the "Poll Time" is different from 0, the converter sends the Write request cyclically and also when the data is changed.

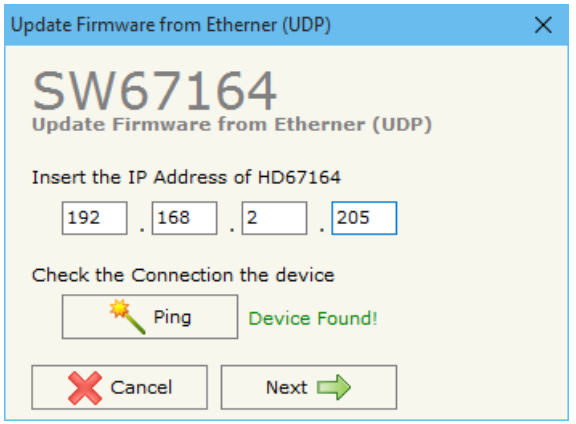
UPDATE DEVICE:

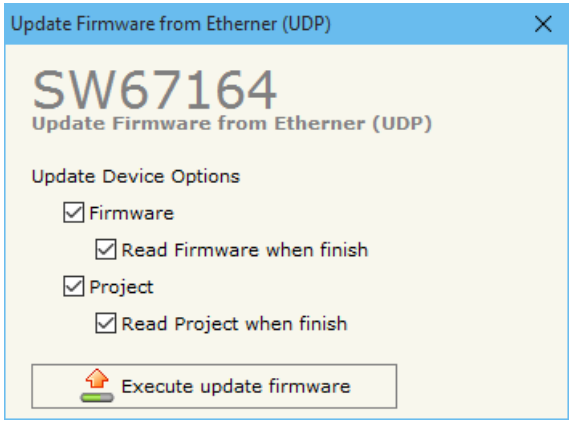
By pressing the "**Update Device**" button, it is possible to load the created Configuration into the device; and also the Firmware, if necessary.

If you don't know the actual IP address of the device you have to use this procedure:

- Turn off the Device;
- Put Dip1 of 'Dip-Switch A' in ON position;
- Turn on the device
- Connect the Ethernet cable;
- Insert the IP "**192.168.2.205**";
- Press the "**Ping**" button, "Device Found!" must appear;
- Press the "**Next**" button;
- Select which operations you want to do;
- Press the "**Execute update firmware**" button to start the upload;
- When all the operations are "OK" turn off the Device;
- Put Dip1 of 'Dip-Switch A' at OFF position;
- Turn on the device.

At this point the configuration/firmware on the device is correctly updated.





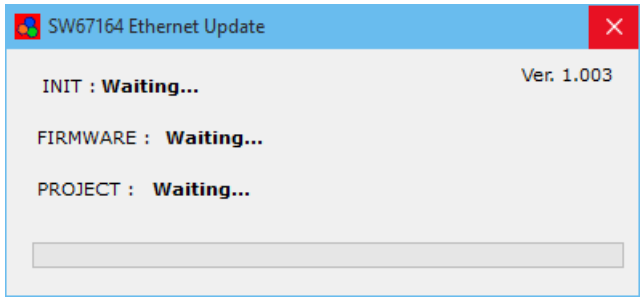


Figure 6: "Update device" windows

If you know the actual IP address of the device, you have to use this procedure:

- Turn on the Device with the Ethernet cable inserted;
- Insert the actual IP of the Converter;
- Press the "**Ping**" button, must appear "Device Found!";
- Press the "**Next**" button;
- Select which operations you want to do;
- Press the "**Execute update firmware**" button to start the upload;
- When all the operations are "OK" the device automatically goes at Normal Mode.

At this point the configuration/firmware on the device is correctly update.

Note:
When you install a new version of the software, if it is the first time it is better you do the update of the Firmware in the HD67164-A1/B2 device.

Note:
When you receive the device, for the first time, you also have to update the Firmware in the HD67164-A1/B2 device.

Warning:
If Fig. 5 appears when you try to do the Update try these points before seeking assistance:

- Try to repeat the operations for the updating;
- Try with another PC;
- Try to restart the PC;
- If you are using the program inside a Virtual Machine, try to use in the main Operating System;
- If you are using Windows Seven or Vista or 8, make sure that you have the administrator privileges;
- Take attention at Firewall lock;
- Check the LAN settings.

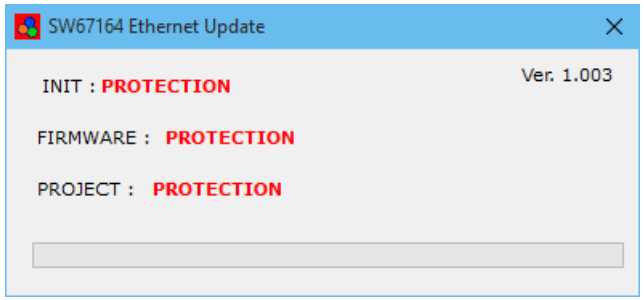


Figure 7: "Protection" window

In the case of HD67164-A1/B2 you have to use the software "SW67164": www.adfweb.com\download\filefold\SW67164.zip.

SNMP COMMUNICATION

In order to read/write the data from/to Modbus side, it is necessary to use specific SNMP commands in order to see the SNMP Input and write the SNMP Output.

Reading Modbus data from SNMP:

In order to read the data from the HD67164-A1/B2 it is necessary to use the "snmpget" command. The Input array is contained to this internal directory: 1.3.6.1.4.1.33118.1.1.1.4.x.0, where 'x' is the number of data block. Each data block has a dimension of 128 bytes.

Example: you want to read informations of the data block 3. The structure of the command to send is:

snmpget –v1 –cprivate "IP Address of the converter" 1.3.6.1.4.1.33118.1.1.1.4.**3**.0

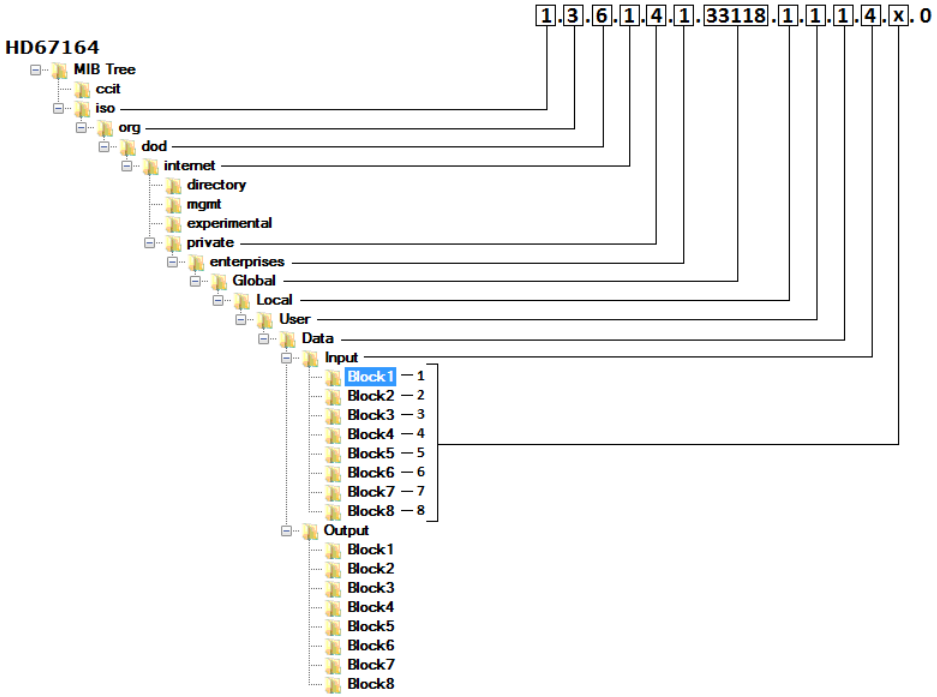


Figure 8a: MIB Tree Input

Writing Modbus data from SNMP:

In order to write the data to the HD67164-A1/B2 it is necessary to use the "snmpset" command. The Output array is contained to this internal directory: 1.3.6.1.4.1.33118.1.1.1.4.x.0, where 'x' is the number of data block. Each data block has a dimension of 128 bytes.

Example: you want to write informations of the data block 3 with the data '0123456789' (ASCII). The structure of the command to send is:

snmpset –v1 –cprivate "IP Address of the converter" 1.3.6.1.4.1.33118.1.1.1.5.**3**.0 s "0123456789"

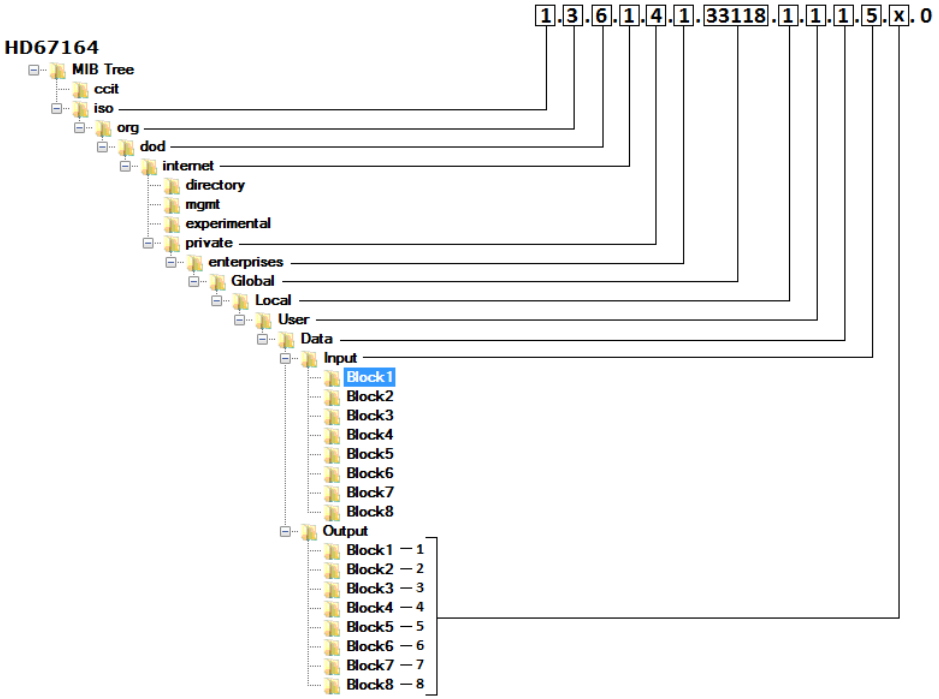


Figure 8b: MIB Tree Output

Note:
The data blocks from 1 to 8 are used to read/write the entire internal SNMP arrays of the converter. The data are represented in bytes.
Each Modbus request defined in the section "Set Modbus Access" is associated to a specific OID too. In order to read/write a specific Modbus request from SNMP, it is necessary to use the Data Block 9.

The Modbus request in write will be mapped consecutively to the Modbus request in read. So, in the MIB structure, you will find all the Modbus request in read defined and then all the Modbus request in write. See the following example for more informations.

Example:

We have defined two Modbus reading requests in the section "Set Modbus Access -> Modbus Read" and two Modbus writing requests in the section "Set Modbus Access -> Modbus Write".

In order to read the data related to the first Modbus reading request (the first raw of the "Modbus Read" table), the OID to require will be 1.3.6.1.4.1.33118.1.1.1.4.**9**.**1** where:

-**9**: Data Block 9
-**1**: First raw of the "Set Modbus Access" section

The Modbus request in write will be mapped consecutively to the Modbus request in read, so, in this example, in order to write the first Modbus writing request (the first raw of the "Modbus Write" table), the OID to require will be 1.3.6.1.4.1.33118.1.1.1.5.**9**.**3** where:

-**9**: Data Block 9
-**3**: n + 1, where 'n' is the last raw's number of the "Modbus Read" table.

Note:
It is possible to read an entire data block or only a specific byte/value (for the Data Block 1 to 8). It depends on the OID used:

- 1.3.6.1.4.1.33118.1.1.1.4.x.0: entire data block
- 1.3.6.1.4.1.33118.1.1.1.4.x.y: value of the data block/specific byte

MECHANICAL DIMENSIONS:

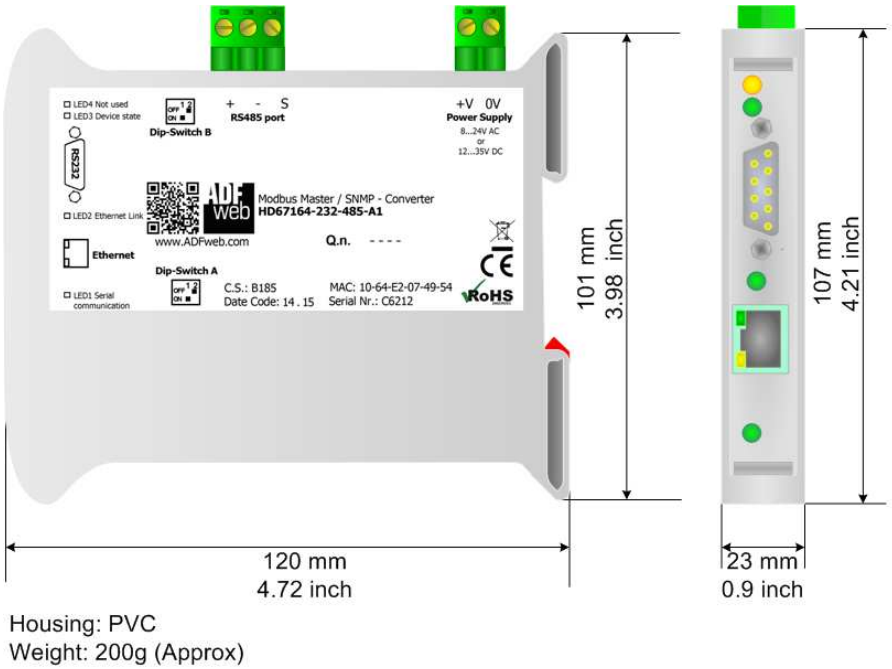


Figure 9a: Mechanical dimensions scheme for HD67164-xxx-A1

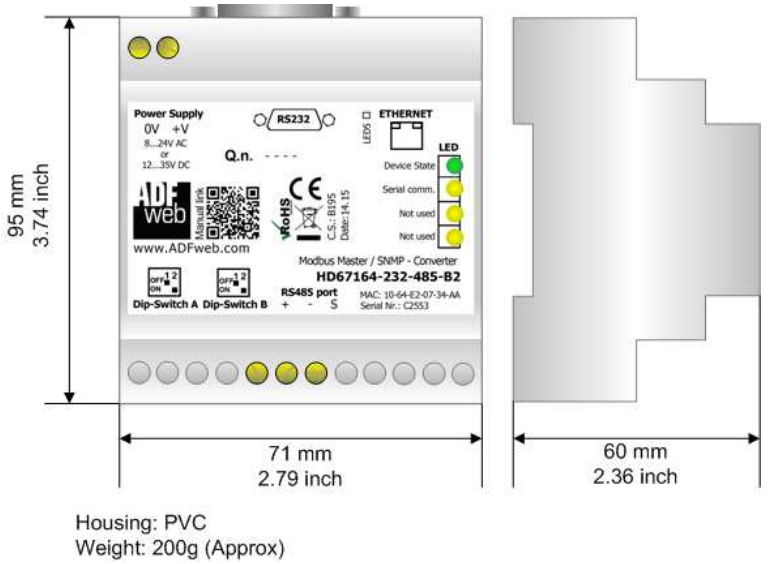


Figure 9b: Mechanical dimensions scheme for HD67164-xxx-B2

ORDERING INFORMATIONS:

The ordering part number is formed by a valid combination of the following:

HD67164 - xxx – x x

Connectors Type
1: Removable 5mm Screw Terminal
2: Fixed 5mm Screw Terminal

Enclosure Type
A: 1M, 35mm DIN Rail mounting
B: 4M, 35mm DIN Rail mounting

Serial Line
232: RS232
485: RS485
422: RS422 (only for A1 version)
232-485: RS232+RS485
232-422: RS232+RS422 (only for A1 version)

Device Family
HD67164: Modbus Master / SNMP - Converter

Order Code:	**HD67164-232-A1**	**-**	Converter Modbus Master / SNMP Converter (RS232 serial)
Order Code:	**HD67164-485-A1**	**-**	Converter Modbus Master / SNMP Converter (RS485 serial)
Order Code:	**HD67164-422-A1**	**-**	Converter Modbus Master / SNMP Converter (RS422 serial)
Order Code:	**HD67164-232-485-A1**	**-**	Converter Modbus Master / SNMP Converter (RS232 + RS485 serial)
Order Code:	**HD67164-232-422-A1**	**-**	Converter Modbus Master / SNMP Converter (RS232 + RS422 serial)
Order Code:	**HD67164-232-B2**	**-**	Converter Modbus Master / SNMP Converter (RS232 serial)
Order Code:	**HD67164-485-B2**	**-**	Converter Modbus Master / SNMP Converter (RS485 serial)
Order Code:	**HD67164-232-485-B2**	**-**	Converter Modbus Master / SNMP Converter (RS232 + RS485 serial)

ACCESSORIES:

Order Code: **AC34001** **-** 35mm Rail DIN - Power Supply 220/240V AC 50/60Hz – 12 V AC

Order Code: **AC34002** **-** 35mm Rail DIN - Power Supply 110V AC 50/60Hz – 12 V AC

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OTHER REGULATIONS AND STANDARDS:

WEEE INFORMATION

Disposal of old electrical and electronic equipment (as in the European Union and other European countries with separate collection systems).

This symbol on the product or on its packaging indicates that this product may not be treated as household rubbish. Instead, it should be taken to an applicable collection point for the recycling of electrical and electronic equipment. If the product is disposed correctly, you will help prevent potential negative environmental factors and impact of human health, which could otherwise be caused by inappropriate disposal. The recycling of materials will help to conserve natural resources. For more information about recycling this product, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

RESTRICTION OF HAZARDOUS SUBSTANCES DIRECTIVE

The device respects the 2002/95/EC Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (commonly referred to as Restriction of Hazardous Substances Directive or RoHS).

CE MARKING

The product conforms with the essential requirements of the applicable EC directives.

WARRANTIES AND TECHNICAL SUPPORT:

For fast and easy technical support for your ADFweb.com SRL products, consult our internet support at www.adfweb.com.
Otherwise contact us at the address support@adfweb.com

RETURN POLICY:

If while using your product you have any problem and you wish to exchange or repair it, please do the following:

- Obtain a Product Return Number (PRN) from our internet support at www.adfweb.com. Together with the request, you need to provide detailed information about the problem.
- Send the product to the address provided with the PRN, having prepaid the shipping costs (shipment costs billed to us will not be accepted).

If the product is within the warranty of twelve months, it will be repaired or exchanged and returned within three weeks. If the product is no longer under warranty, you will receive a repair estimate.

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